

What is claimed is:

1. A pressure intensifier for fluids comprising:
  - an intensifier piston comprising a high-pressure piston and a low-pressure piston having a greater diameter than the high-pressure piston;
  - a high-pressure cylinder, wherein the high-pressure piston is moveably arranged in the high-pressure cylinder;
  - a low-pressure cylinder, wherein the low-pressure piston is moveably arranged in the low-pressure cylinder and wherein the high-pressure piston and the low-pressure piston move together;
  - a high-pressure connection, wherein the high-pressure cylinder is connected to the high pressure connection;
  - a return connector;
  - a control valve having a first switching position and a second switching position;
  - a supply connector;
  - a first control line connected to the supply connector;
  - a second control line connected to the control valve;
  - a first connection connecting the first and second control lines;

wherein the low-pressure cylinder is connected via the control valve in the first switching position to the supply connector and in the second switching position to the return connector;

wherein the first and second switching positions are controlled by a position of the intensifier piston, wherein the intensifier piston opens or closes the first connection between the first control line and the second control line;

wherein the first connection is arranged completely within a movement stroke of the high-pressure piston.

2. The pressure intensifier according to claim 1, wherein the high-pressure cylinder and the high-pressure piston delimit a high-pressure chamber, wherein the first and second control lines have openings in a wall of the high-pressure cylinder in an area that, independent of a position of the intensifier piston, is located outside of the high-pressure chamber.

3. The pressure intensifier according to claim 2, wherein the high-pressure piston has a recess overlapping in a predetermined position of the intensifier piston the openings of the first and second control lines, wherein the recess forms the first connection.

4. The pressure intensifier according to claim 3, wherein the recess is an annular chamber.

5. The pressure intensifier according to claim 3, further comprising a seal arrangement comprising a leakage drainage line, wherein the seal arrangement is arranged between the recess and the high-pressure chamber.

6. The pressure intensifier according to claim 1, wherein the control valve is connected to the return connector by a path extending through the low-pressure cylinder in an area between the high-pressure piston and the low-pressure pistons.

7. The pressure intensifier according to claim 1, further comprising a second connection between the control valve and the low-pressure cylinder, wherein the low-pressure piston has at least one end face provided with a circumferentially extending recess, wherein the second connection opens at a circumferential wall of the low-pressure cylinder in an area of an end face of the low-pressure cylinder.

8. The pressure intensifier according to claim 1, further comprising a throttled auxiliary control path arranged between the supply connector and a control connector of the control valve, wherein the auxiliary control path switches the control valve into the first switching position.

9. The pressure intensifier according to claim 8, wherein the throttled auxiliary control path is arranged in a valve element of the control valve.